REMARKS

Reconsideration of the present application is respectfully requested.

Claim 21 has been amended to correct inconsistencies and to recite further details of the magnetic dipole orientation of the motor of the present invention.

Claims 21 and 22 have been rejected under 35 U.S.C. 102(b) as being anticipated by JP 5176509 to Hino Youji (Hino '509). For the reasons discussed below, Applicant believes these claims, as amended, overcome this rejection.

Applicant's claim 21, as it currently stands in view of the above amendment, recites a direct current motor comprising magnets each having a main part and an extension part of similar uniform thickness. Amended claim 21 also recites that a magnetization in the extension part and an end side is stronger than the magnetization at a boundary part between the main part and the extension part. In addition, amended claim 21 recites that a magnetic dipole orientation in the main part is directed to a rotation axis of the armature, a magnetic dipole orientation in the boundary part between the main part and the extension part is directed to a radially outer side from the rotation axis of the armature and a magnetic dipole orientation in the end side of the extension part is directed to the rotation axis of the armature.

Hino '509 discloses a direct current motor for reducing cogging torque (rather than improving commutation as in the present invention) including two anisotropic magnets. As shown in Fig. 1, and stated in the abstract, lines 6-8, the magnetic fields of the centers and in the vicinities of the magnets 10 and 12 are oriented in an axial direction and the magnetic fields of the outer edges of the magnets are oriented parallel to the magnetic fields of the centers of the magnets. Hino '509 also discloses in translated paragraph [0016] that the magnetic flux density gradually decreases from the central part of the magnets to the end parts of the magnets.

Applicant respectfully asserts that the direct current motor of the present invention is patentably distinct from the direct current motor disclosed by Hino '509. Specifically, the magnetic dipole orientation of amended claim 21 of the present invention is "stronger at a boundary part between the main part and the extension." Applicant respectfully asserts that in disclosing that the magnetic flux density gradually decreases from the central part to the end parts, Hino '509 teaches away from claim 21 of the present invention.

In view of the above discussion, Applicant respectfully requests that the 35 U.S.C. 102(b) rejection of amended claim 21 over Hino '509 be withdrawn.

Claim 22 depends from claim 21. Therefore, the rejection of claim 22 should be withdrawn in view of the above-mentioned reasons with respect to amended claim 21.

Claims 21 and 22 have been rejected under 35 U.S.C. 102(b) as being anticipated by JP 5176510 to Hino Youji (Hino '510) or alternately JP 5168209 to Hino Youji (Hino '209). Applicant respectfully traverses this rejection.

Hino '510 discloses a direct current motor with two anisotropic magnets wherein the magnetic fields of the centers and vicinities of the magnets 10 and 12 are oriented in an axial direction and the magnetic fields of the outer edges of the magnets are oriented parallel to the centers of the magnets, similar to that of Hino '509. However, as recited in Applicant's amended claim 21, the magnetic fields of the present invention are such that "magnetic dipole orientation in the main part is directed to a rotation axis of the armature, magnetic dipole orientation in a boundary part between the main part and the extension part is directed to a radially outer side from the rotation axis of the armature and magnetic dipole orientation in an end side of the extension part is directed to the rotation axis of the armature." The orientation of the magnetic fields of the present invention is significant as it facilitates improving commutation.

The orientation of the magnetic fields of Hino '510 were designed to reduce cogging torque, as described above in reference to Hino '509.

Hino '209 discloses a direct current motor for attenuating ripple torque. As shown in Fig. 1 and disclosed on lines 8-9 of the abstract, the center of the magnetic poles is oriented to be positionally shifted from the center of the magnets by the angle of θ of an armature reaction component. As discussed above, amended claim 21 recites that the magnetic field is "stronger at a boundary part between the main part and the extension." Hino '209 does not disclose this feature as the orientation described in lines 13-17 of claim 21 as discussed above regarding Hino '510.

In view of the above arguments, Applicant respectfully requests that the rejection under 35 U.S.C. 102(b) in view of Hino '510 and Hino '209 be withdrawn.

Claims 23 – 28 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Hino '510, Hino '209, or Hino '509 in view of U.S Patent No. 6,155,421 to Cooper. Applicant respectfully traverses this rejection.

As discussed above in connection with claims 21 and 22, Hino '509, Hino '510 and Hino '209 fail to disclose certain aspects of the motor of claim 21 of the present invention, such as, for example, that the magnetic dipole orientation is "stronger at a boundary part between the main part and the extension."

Cooper discloses a container for packaging and unwinding a coil of wire that includes position indicators (see col. 3, lines 16 – 32) which define an position where the ends of the strip are to be positioned. Cooper fails to disclose a magnet, much less a magnetic dipole orientation which is "stronger at a boundary part."

Hino '509, Hino '510, Hino '209 and Cooper, considered individually or in combination, fail to teach or suggest all features of claim 21. Applicant therefore respectfully requests that the rejection under 35 U.S.C. 103(a) of claims 23-28, which depend from claim 21, be withdrawn.

New claims 29 - 32 are presented for examination. New claims 29 – 30 further define the extension part of the motor of claim 21 of the present invention in a manner that is supported by the specification. New independent claims 31 and 32 recite the direct current motor of the present invention and generally correspond to claim 21.

In view of the above amendments and remarks, the present application is believed to be in condition for allowance. A prompt notice to that effect is respectfully requested.

Although no additional fees are believed to be due, permission is hereby given to charge any unforeseen fees to deposit account 50-1147.

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Respectfully submitted,

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MARKED-UP VERSION OF AMENDED CLAIMS

Please amend claim 21 as follows:

21. (Amended) A direct current motor comprising:

an armature having a core and coils wound on the core;

magnets arranged to face each other through the armature;

a commutator operatively connected to the coils; and

a brush disposed in sliding contact with the commutator for shorting each coil during a commutation period to reverse a direction of current in the coil,

wherein each magnet has a main part and an extension part at an end of the main part to generate in the coil an induction voltage that counteracts a reactance voltage,

wherein the main part and the extension part have a similar uniform thickness;

wherein a magnetization in the extension part at an end side in a rotation direction of the armature is stronger than that at a boundary part between the main part and the extension part, and

wherein a magnetic dipole orientation in the main part is directed to a rotation axis of the armature, a magnetic dipole orientation in the boundary part between the main part and the extension part is directed to a radially outer side from the rotation axis of the armature and a magnetic dipole orientation in the end side of the extension part is directed to the rotation axis of the armature [a radially outer side from the rotation axis of the armature].